PATENT SPECIFICATION

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Complete Left: Aug. 26, 1925.

Complete Accepted: Feb. 25, 1926.

PROVISIONAL SPECIFICATION.

Improvements in Governing Apparatus for Internal Combustion Engines.

I, RICHARD OLDHAM, of "Holmwood," Portland Place, Cleethorpes, in the County of Lincoln, a British subject, do hereby declare the nature of this invention to be as follows:—

This invention relates to governing apparatus for internal combustion engines, and it has for its object extremely simple apparatus for controlling the supply of oil or other liquid fuel to the engine and will regulate the quantity supplied to suit the speed at which the engine is running.

In carrying out my invention, I employ a perpendicular shaft rotatable in suitable bearings, the said shaft being driven by the crank shaft of the engine through bevel or other suitable gearing.

Secured on such shaft is a strong collar or the like provided with brackets or arms in or to which are pivoted governor weights, the said weights being provided with inwardly projecting arms or members and being connected by a spring or springs preferably provided with suitable tensioning means.

Mounted on the shaft above the collar or the like provided with the brackets or arms in or to which the weights are pivoted, is a sleeve which is adapted to slide up and down on the shaft but is caused to rotate with the shaft by a key on the shaft engaging a keyway in such sleeve, or by any other suitable means, the said sleeve being provided with an annular recess in its periphery at or near its lower end, the inwardly projecting arms or members with which the weights are provided being each provided at their inner end with a strong pin or stud which pins or studs project into the annular recess in the sleeve, such sleeve being also provided with a preferably tapered key or the like which projects from its periphery.

If desired, instead of providing the shaft with a collar or the like provided with brackets or arms in or to which the governor weights are pivoted and securing such collar or the like on the shaft, I may provide the shaft with a suitable enlargement and secure the brackets or arms to such enlargement. Instead of providing the sleeve slidably mounted on the shaft with an annular recess to receive the pins or studs with which the inner ends of the inwardly projecting arms of the governor weights are provided, I may provide such sleeve with slot-holes to receive such pins or studs.

The mechanism is enclosed in a suitable casing made in two or other suitable number of pieces bolted or otherwise suitably detachably connected whereby a part, or parts can be readily removed to allow of access being had to the mechanism, the bottom of the casing being preferably provided with a ball or like bearing which takes the thrust of the shaft.

In operation, as the shaft rotates, the governor weights carried thereby swing outwardly and cause the inwardly projecting arms with which the said weights are provided to press down the sleeve slidable on the shaft, the tapered key or the like on the periphery of which sleeve as such sleeve rotates with the shaft, pushes a suitably located rod or plunger which pushes a device which in turn pushes the stem of the plunger of the or liquid fuel pump. As the speed of the engine increases, the arms of the governor weights press the sleeve provided with the tapered key or the like further down on the shaft and as the said key or the like is tapered, the lower the sleeve is pressed the shorter are the pushes administered by the key or the like, on the rod or plunger and

[*Price* 1/-]

consequently on the plunger of the pump, with the result that the quantity of oil or liquid fuel pumped is correspondingly less, until, on the speed of the engine slackening, the swing of the governor balls decreases, the sleeve provided with the key or the like rises on the shaft, and the key thereof administers longer pushes to the rod or plunger through which, longer pushes are administered to the plunger of the pump with the result that the length of stroke of the pump plunger is increased and the charge of oil or other liquid fuel is correspondingly increased.

Dated the 26th day of November, 1924.

LOUIS E. KIPPAX,
Gough Chambers, Savile Street, Hull,
Patent Agent for the Applicant.

COMPLETE SPECIFICATION.

Improvements in Governing Apparatus for Internal Combustion Engines.

I, RICHARD OLDHAM, of "Holmwood," Portland Place, Cleethorpes, in the County of Lincoln, a British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to governing apparatus for internal combustion engines and more especially those of the Diesel or semi-Diesel type, and it has for its object extremely simple apparatus for controlling the supply of oil or other liquid fuel to the engine whereby the quantity of fuel supplied will be regulated to suit the speed at which the engine is running.

In carrying out my invention, I employ a perpendicular shaft rotatable in suitable bearings, the said shaft being driven by the crank shaft of the engine through bevel or other suitable gearing.

Secured on such shaft is a strong collar or the like provided with brackets or arms in or to which are pivoted governor weights, the said weights being provided with inwardly projecting arms or members and being, if desired, connected by a spring or springs which may be provided with suitable tensioning means.

Mounted on the shaft, above the collar or the like provided with the brackets or arms in or to which the weights are pivoted, is a sleeve which is adapted to slide up and down on the shaft but is caused to rotate with the shaft by a key on the shaft engaging a keyway in such sleeve, or by any other suitable means, the said sleeve being provided with an annular recess in its periphery at or near its lower end, the inwardly projecting arms or members with which the weights are provided being each provided at its inner end with a strong pin or stud, which pins or studs project into the annular recess in the sleeve, such sleeve being also provided with a preferably tapered key or the like which projects from its periphery.

If desired, instead of providing the shaft with a collar or the like provided with brackets or arms in or to which the governor weights are pivoted and securing such collar or the like on the shaft, I may provide the shaft with a suitable enlargement and secure the brackets or arms to such enlargement.

Instead of providing the sleeve slidably mounted on the shaft with an annular recess and employing bent weighted pivoted levers the top ends of which are provided with pins or studs which work in such annular recess, I may pivot two pairs of links to lugs on such sleeve, the said pairs of links being pivoted respectively to two weighted levers which are in turn pivoted to lugs on the fixed collar on the perpendicular shaft.

If desired, instead of the weights being connected by springs, a helical spring may be arranged around the perpendicular shaft between the fixed collar and the slidable sleeve.

The mechanism is enclosed in a suitable casing made in two or other suitable number of pieces bolted or otherwise suitably detachably connected whereby a part, or parts can be readily removed to allow of access being had to the mechanism, the bottom of the casing being preferably provided with a ball or like bearing which takes the thrust of the shaft.

In the casing is mounted a slidable rod or the like and pivoted to the casing in proximity to such rod or the like is an angle-shaped member under the horizontal limb of which is arranged the plunger of the fuel pump, the tapered key on the shaft of the governor at each rotation of the shaft forcing the slidable rod or the like forward so causing it to tilt the pivoted angle-shaped member the

horizontal limb of which presses on the top of the plunger of the fuel pump so effecting the pumping of the oil or liquid to the engine.

Having thus stated the object and described the nature of my invention, I will now proceed to describe my said invention in greater detail and in so doing will refer to the accompanying two sheets of explanatory drawings of which Fig. 1 is a front elevation of engine governing apparatus in accordance with my invention, parts of the casing of the apparatus being broken away, Fig. 2 is a view of the portion of the shaft with the slidable sleeve, fixed collar and the weighted levers mounted thereon, removed from the casing, taken in the direction of the arrow in Fig. 1, and Fig. 3 is a plan view of Fig. 2.

Fig. 4 is a similar view to Fig. 1 but of a slightly modified construction of the apparatus, and Fig. 5 is a similar view to Fig. 2 but of the modified construction of the apparatus shown at Fig. 4.

Referring first to Figs. 1 to 3 inclusive of the drawings, A is a casing made in two portions as shown, and removably secured together by any suitable means, as for example, by screws *a*, the said casing being provided at the bottom with a hollow stem a^1, B is a perpendicular shaft which extends through the centre of the casing A, the lower portion of which shaft is rotatable in the hollow stem a^1 of the casing and the top end in the tubular portion a^2 at the top of the casing, C being a bevel wheel keyed or otherwise secured on the bottom of the said shaft, and D is a horizontal shaft driven by the crank-shaft of the engine by any suitable means such as a bevel wheel on such crank shaft, *d* being a bevel wheel on the shaft D, the said wheel *d* gearing with the bevel wheel C on the perpendicular shaft B.

E is a sleeve mounted on the upper portion of the perpendicular shaft B and slidable up and down thereon but is caused to rotate with the shaft by a key *b* fitted in the shaft engaging a keyway in the said sleeve, *e* being an annular recess formed in the lower end of the sleeve and e^1 a perpendicular inclined and tapered key or pecker secured to the periphery of the sleeve.

F is a collar secured on the shaft B a suitable distance below the sleeve E by a pin *f*, the said collar being provided with diametrically oppositely situated inclined arms f^1, f^2 shown bifurcated at the top, see more especially Figs. 2 and 3, and G, G^1 are two arms pivoted, one in the bifurcated top end of the arm f^1 and the other in the bifurcated top end of the arm f^2 carried by the collar F, the pivoted arm G being provided at its outer end with a weight *g* and at its inner and top end with a pin or stud g^1 which projects into the annular recess *e* in the lower end of the sleeve E, the pivoted arm G^1 being similarly provided at its outer end with a weight g^2 and at its inner and top end with a pin or stud g^3, the inner top ends of the arms G, G^1 being bent outwardly as shown to pass one at one side and the other at the opposite side of the shaft B whereby the pins or studs g^1, g^3 carried by such ends are located in opposite sides of the annular groove in the lower portion of the sleeve E.

g^4, g^5 are two spiral springs which connect the weights *g*, g^2 of the pivoted arms G, G^1 and tend to draw such weights towards the shaft.

H is an anti-friction bearing arranged in the inside of the bottom of the casing A and on which the collar F rests and rotates, the said bearing taking the downward thrust of the shaft.

J is a rod or bar preferably square in cross section which passes through and is slidable in a correspondingly shaped bush a^2 fitted in a hole in the upper and removable portion of the casing A, the inner end of the rod or bar being forked, *j* is a small wheel arranged in the forked inner end of the rod or bar, the said wheel being rotatable on a pin j^1 passed through the forked end of the rod or bar, such wheel being shown as having a bevelled periphery, and j^2 is a pin passed through the outer end of the rod or bar to limit the inward movement of such rod or bar.

K is an angle-shaped member pivoted between lugs on the upper and removable portion of the casing A, one lug *k* only being seen, see Fig. 1, and L indicates the fuel pump the top of the plunger *l* of which is situated directly under the horizontal limb of the pivoted angle-shaped member K which bears on the same.

In operation, as the shaft B driven by the shaft D from the crank shaft of the engine, rotates, the weights *g*, g^2 of the bent pivoted arms G, G^1 swing outwardly and the pins or studs g^1, g^3 carried by the inner ends of such pivoted arms by engaging the annular recess *e* in the slidable sleeve E pull down or push up the said sleeve depending upon the speed at which the shaft B is rotating.

As the sleeve rotates the tapered key or pecker e^1 fitted thereto rotates with it and at each rotation comes in contact with the wheel *j* mounted in the inner end of the rod or bar J slidable in the

removable upper portion of the casing A and forces such rod or bar forwards and causes its outer end to push the perpendicular limb of the pivoted angle-shaped member K forward which tilts such angle-shaped member with the result that the horizontal limb thereof presses on the top of the plunger *l* of the fuel pump L and forces down such plunger which pumps the necessary charge of oil or other liquid fuel to the engine.

As the speed of the engine increases, the weights fly further outwards with the result that the pins or studs g^1, g^3 carried by the ends of the weighted arms G, G^1 press the sleeve E provided with the tapered key or pecker e^1 further down on the shaft B and as the said key or pecker is tapered, the lower the sleeve is pressed the shorter are the pushes administered by the key or pecker on the rod or bar J, and consequently on the plunger of the pump L with the result that the quantity of oil or liquid fuel pumped to the engine is correspondingly less, until, on the speed of the engine slackening, the swing of the weights decreases, the sleeve provided with the key or pecker moves upwardly on the shaft, and the key or pecker thereof administers longer pushes to the rod or bar through which longer pushes are administered to the plunger of the pump with the result that the length of stroke of the pump plunger is increased and the charge of oil or other liquid fuel pumped to the engine is correspondingly increased.

Referring now to Figs. 4 and 5 of the drawings which show a slightly modified form of connection between the collar F secured on the shaft B and the sleeve E slidable vertically on the said shaft, f^3 and f^4 are two pairs of diametrically oppositely situated lugs with which the collar F is provided, and e^2. e^3 are two diametrically oppositely situated lugs with which the slidable sleeve E is provided, M, M^1 are two levers the bottom ends of which are pivoted between the pair of lugs f^3 and the pair of lugs f^4 respectively on the collar F, the said levers having weights *m*, m^1 at their top ends, and N, N^1 are two pairs of links the top ends of which are pivoted to the lugs e^2, e^3 on the sleeve E and the bottom ends of which are pivoted to the weights *m*, m^1 of the pivoted levers M, M^1.

O is a suitably strong spiral spring arranged on the shaft B between the fixed collar F and the slidable sleeve E for supporting the slidable sleeve, the said spring yielding to the downward pressure of the sleeve on the sleeve being pulled down by the swinging outwardly of the pivoted weights and assisting in causing the upward movement of the sleeve as the outward swing of the weights lessens as a result of the speed of rotation of the shaft decreasing.

The operation of the apparatus is substantially the same as that described with reference to the apparatus illustrated at Figs. 1 to 3 inclusive of the drawings.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Apparatus for regulating the supply of oil or other liquid fuel to internal combustion engines according to the speed at which the engine is running, characterised by a rotatable perpendicular shaft driven by any suitable means by the engine, a collar secured on the rotatable shaft, and a sleeve so mounted on the shaft above the said fixed collar as to be rotatable with the shaft but to be adapted to slide up and down thereon within suitable limits, the said fixed collar and the slidable sleeve being connected by pivoted members suitably weighted which are adapted to swing outwardly against the action of a spring or springs on the perpendicular shaft rotating and carrying the fixed collar and the slidable sleeve around with it, the slidable sleeve being provided on its periphery with a perpendicular inclined key or pecker, a casing which encloses the fixed collar, the weighted pivoted members the slidable sleeve and the portion of the shaft provided with the same, and has a hollow stem in which the lower portion of the shaft rotates, a rod or bar slidable in an aperture in one side of the casing and adapted to be pressed outwardly by the inclined key or pecker of the sleeve slidable on the perpendicular shaft as such key or pecker rotates with the sleeve, an angle-shaped member pivoted in lugs on the outside of the casing, the perpendicular limb of which member is adapted to be pushed by the rod or bar slidable in the aperture in the side of the casing to tilt such member and cause the horizontal limb thereof to force down the plunger of the oil or like fuel pump which is arranged below the said horizontal limb.

2. In apparatus according to Claim 1, springs connected to the weights *g*, g^2 in the arrangement illustrated at Figs. 1 to 3 inclusive of the drawings, for the purpose set forth.

3. In apparatus according to Claim 1, or to Claim 2, a wheel arranged in the inner end of the rod or bar for receiving

the blows given by the key or pecker of the slidable sleeve mounted on the perpendicular shaft.

4. The improved apparatus for regulating the supply of oil or other liquid fuel to internal combustion engines, substantially as hereinbefore described with reference to Figs. 1 to 3 inclusive of the accompanying drawings, or modified as described with reference to Figs. 4 and 5 thereof, and operating as set forth.

Dated the 25th day of August, 1925.

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Patent Agent for the Applicant.

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FIG. 1

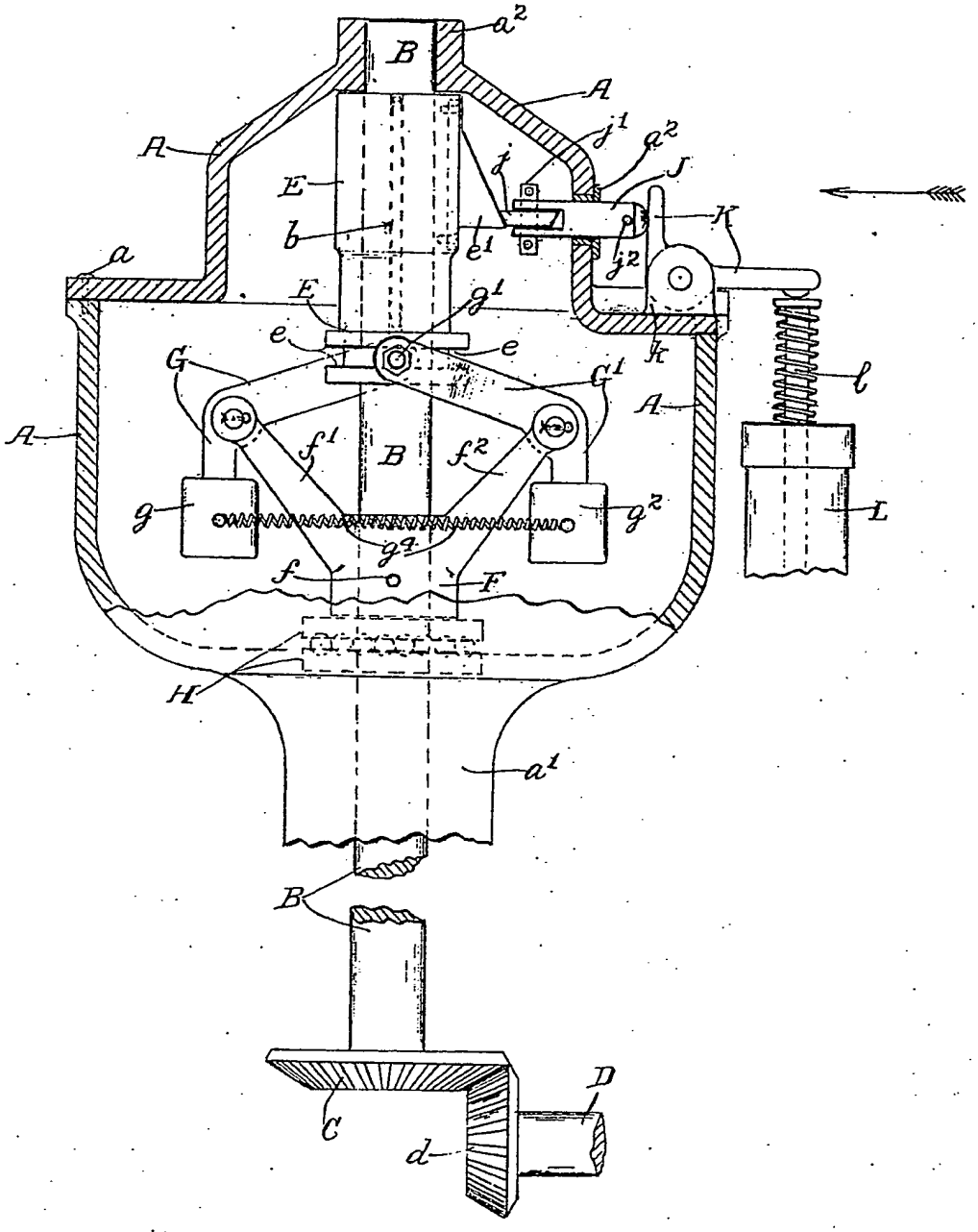

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FIG. 2.

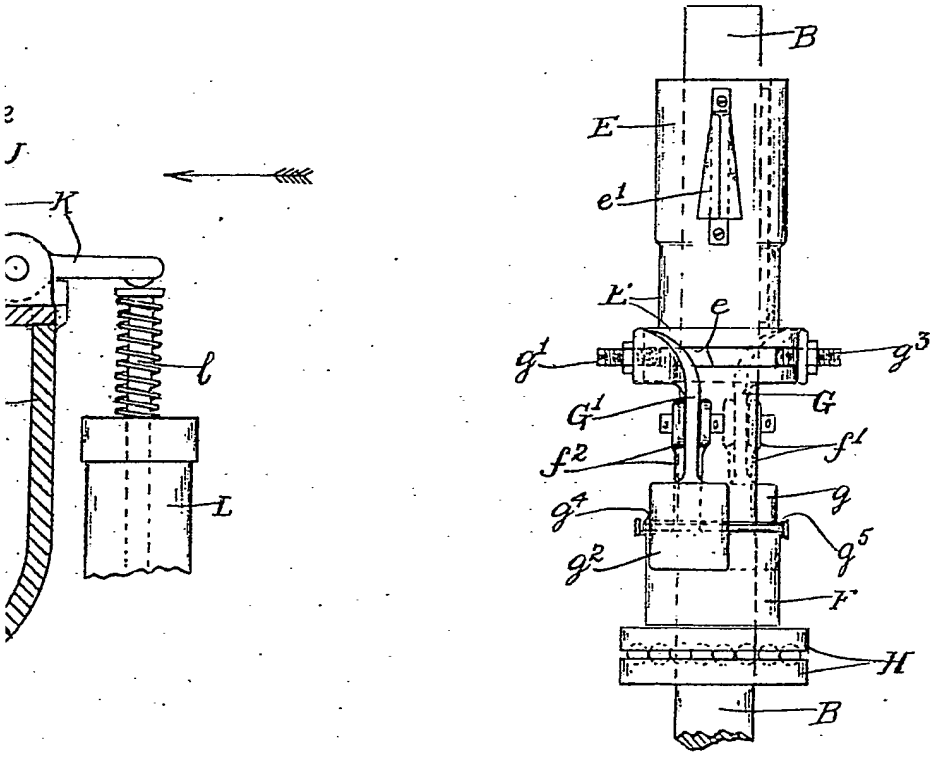

FIG. 3.

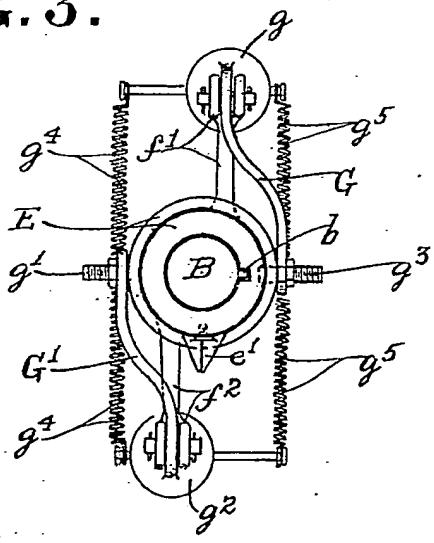

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FIG. 1

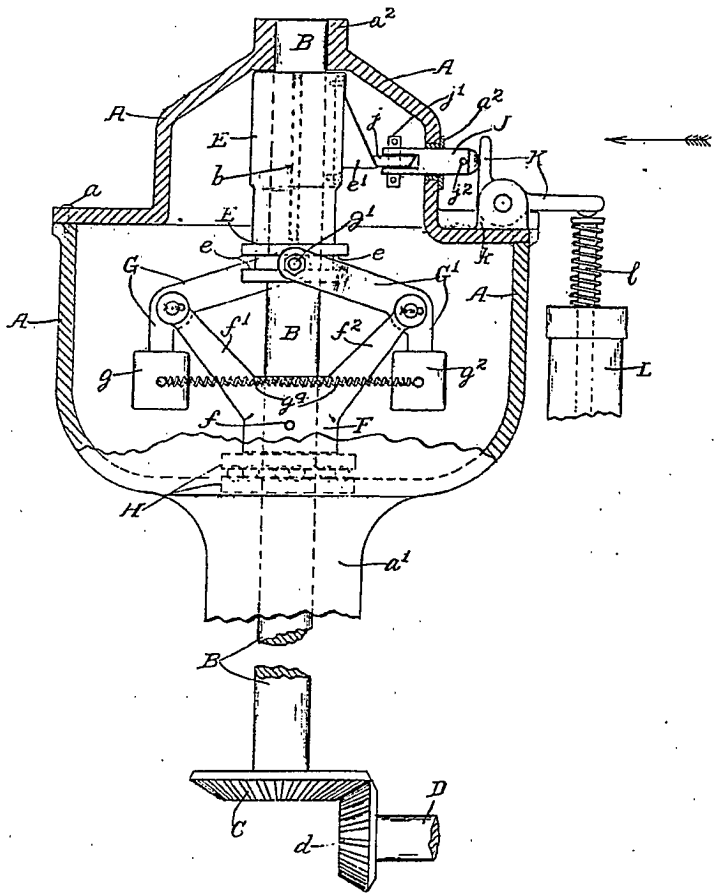

FIG. 2.

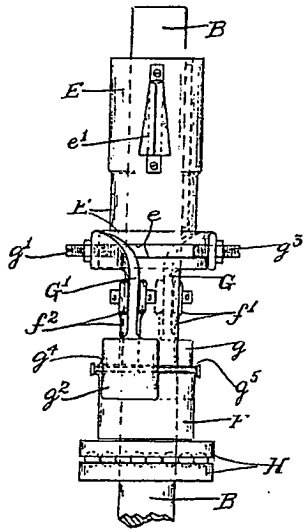

FIG. 3.

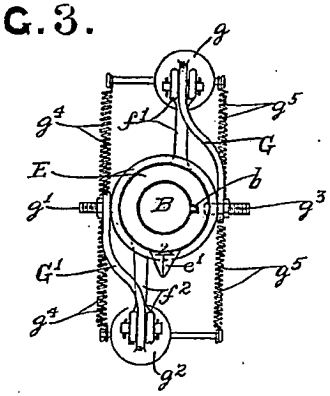

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FIG. 4.

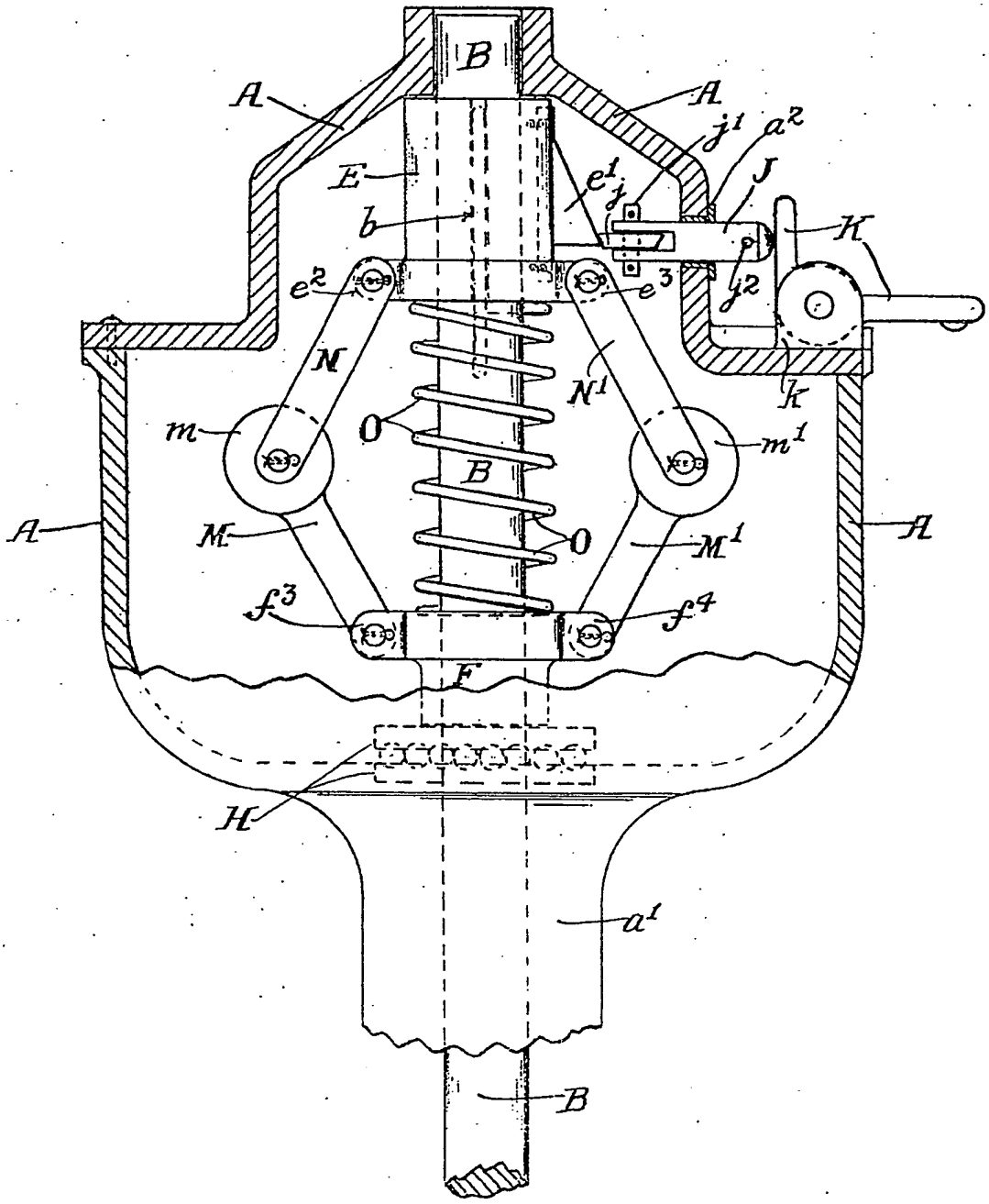

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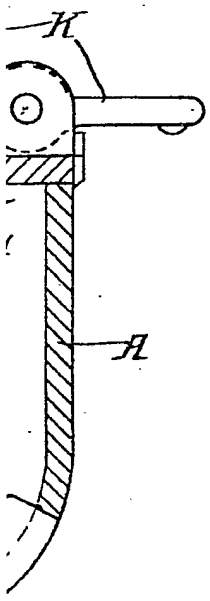
FIG.5.



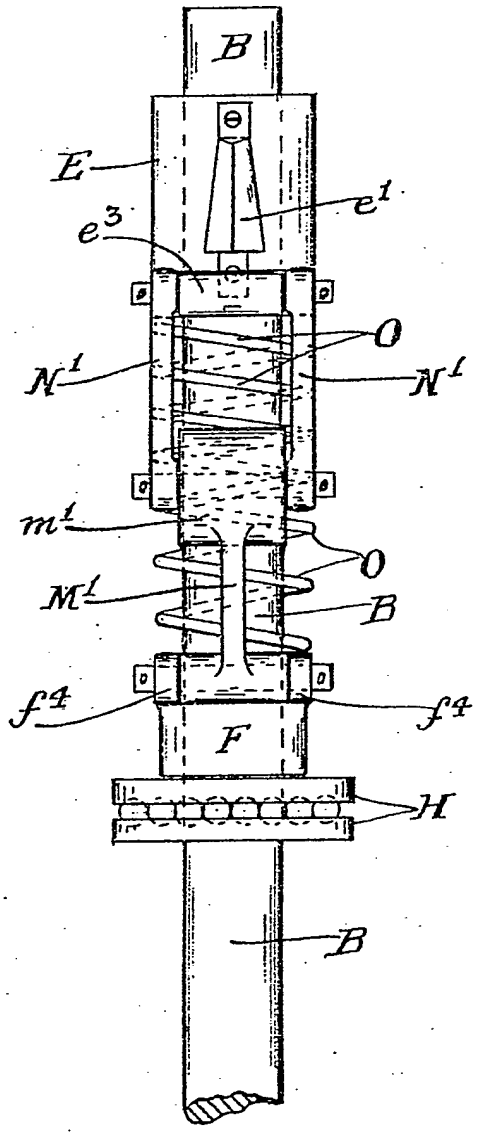


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FIG. 4.

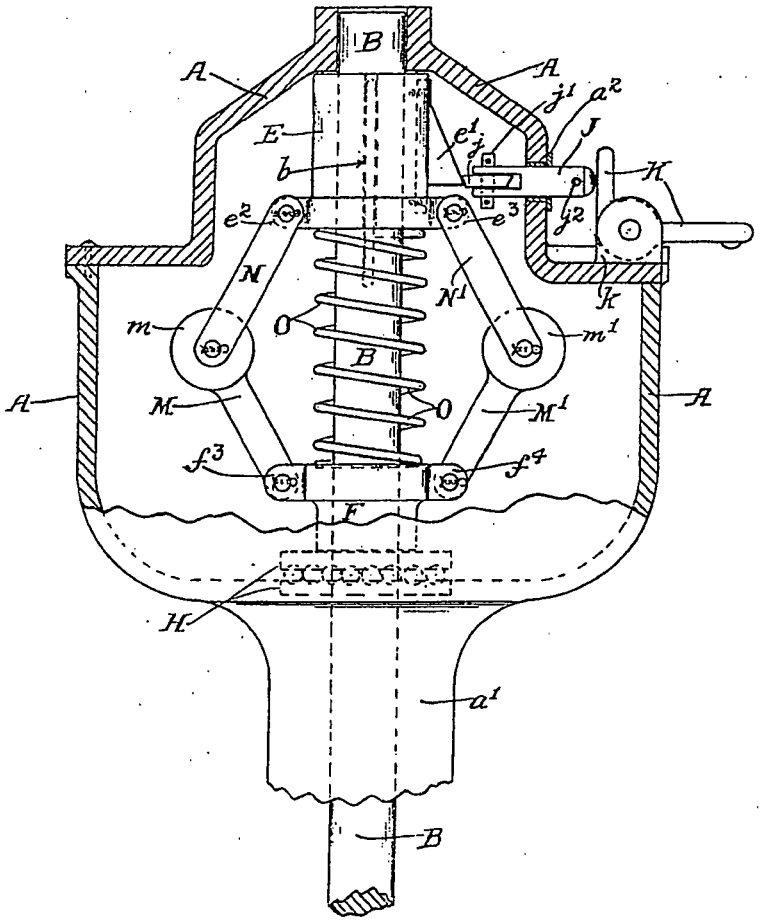
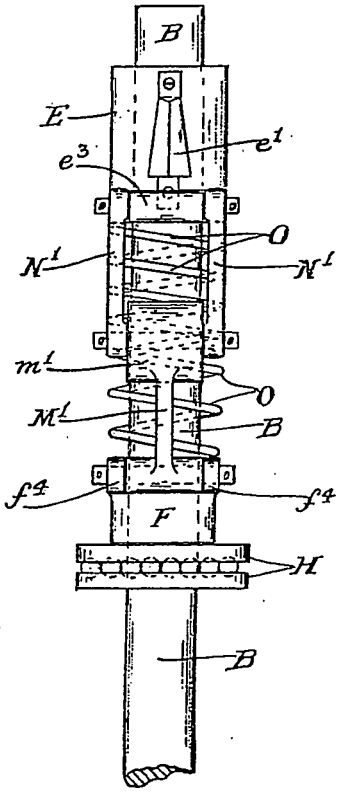


FIG. 5.



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